FIG 1

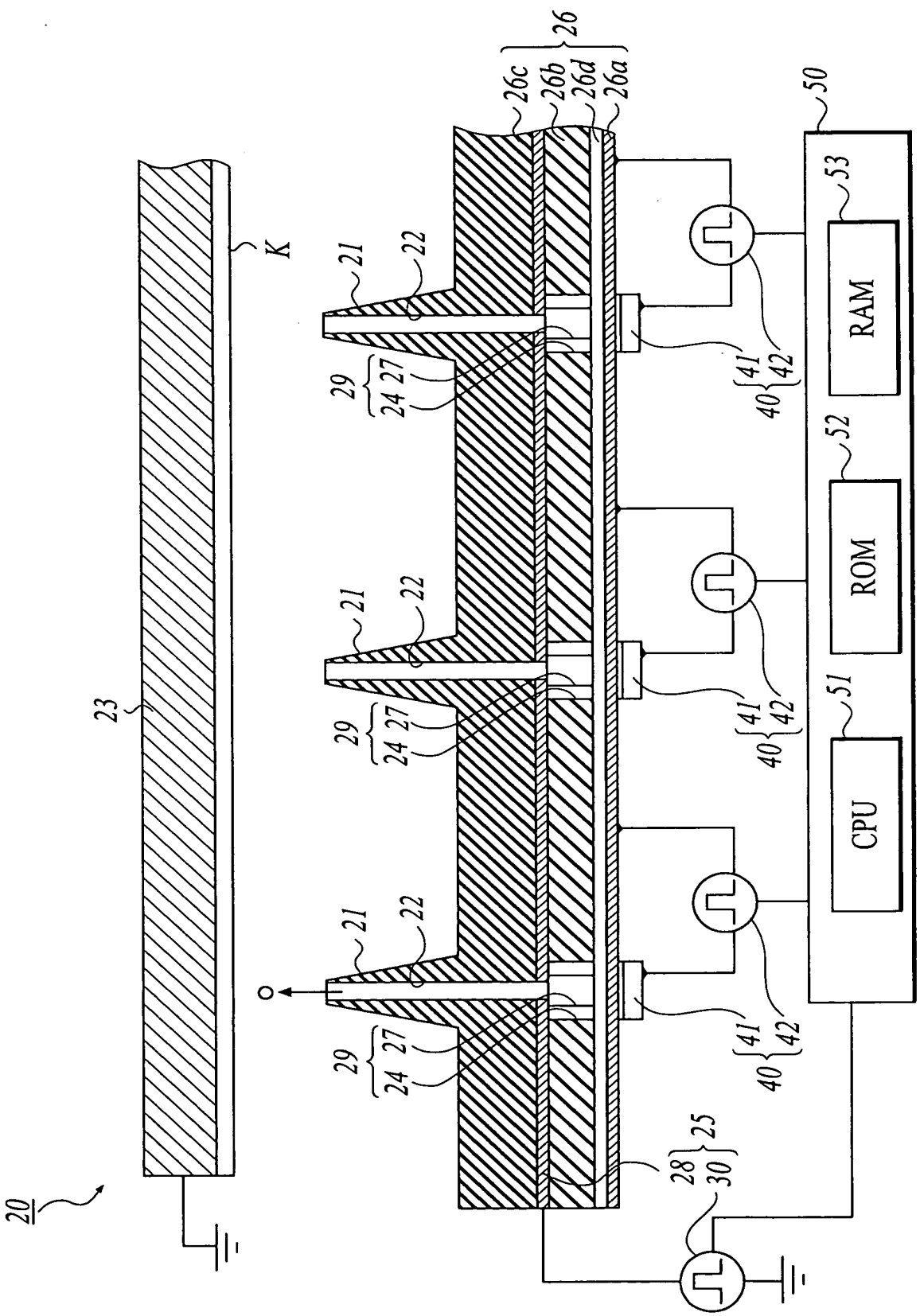
20
23
K
21
22
29
24
27
26
26c
26b
26d
26a
O
40
41
42
25
28
30
50
51
CPU
52
ROM
53
RAM

FIG.2A

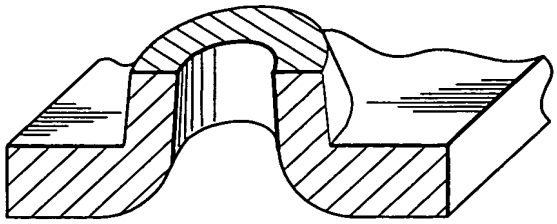

FIG.2B

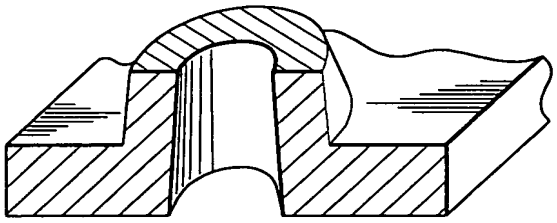

FIG.2C

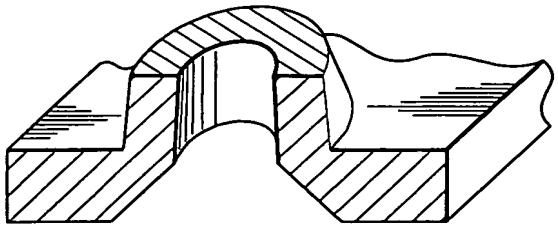

FIG.3A

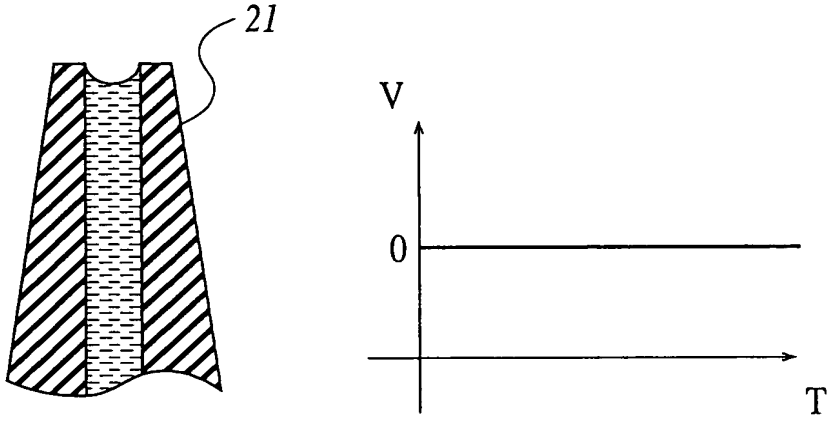

FIG.3B

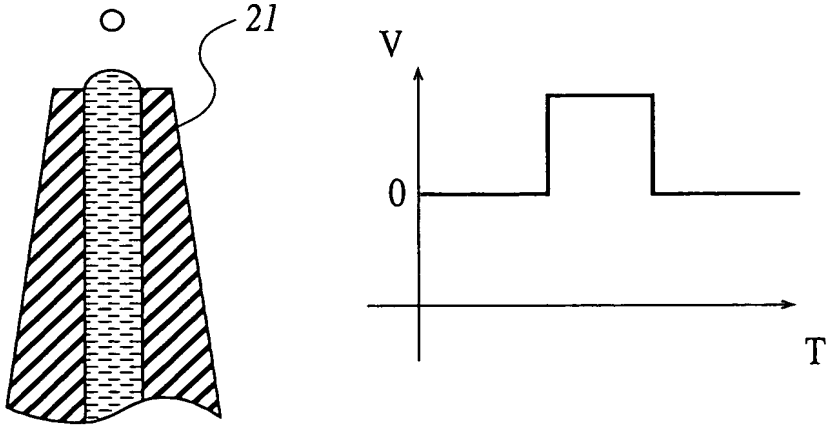

FIG.4

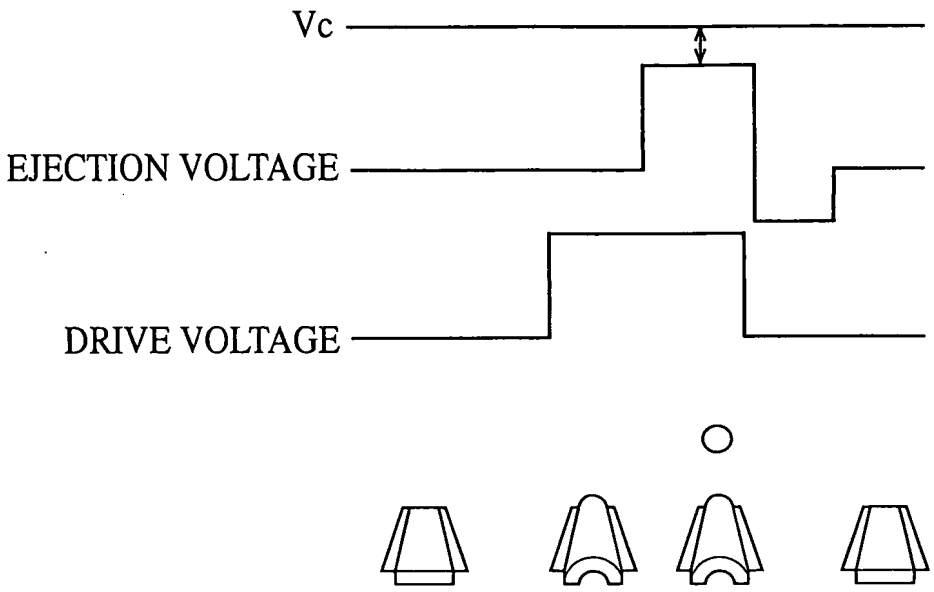
Vc
EJECTION VOLTAGE
DRIVE VOLTAGE

FIG.5

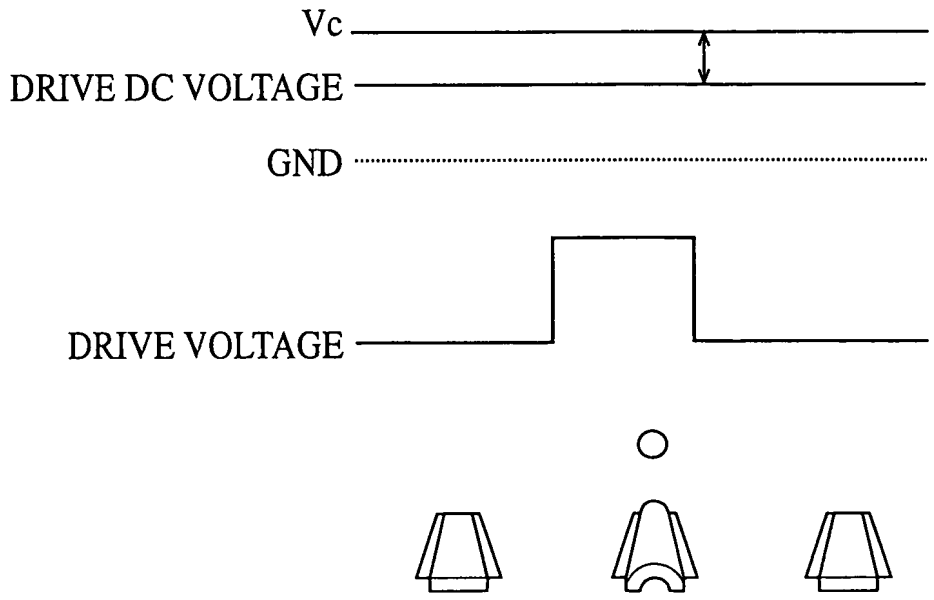
Vc
DRIVE DC VOLTAGE
GND
DRIVE VOLTAGE

FIG.6

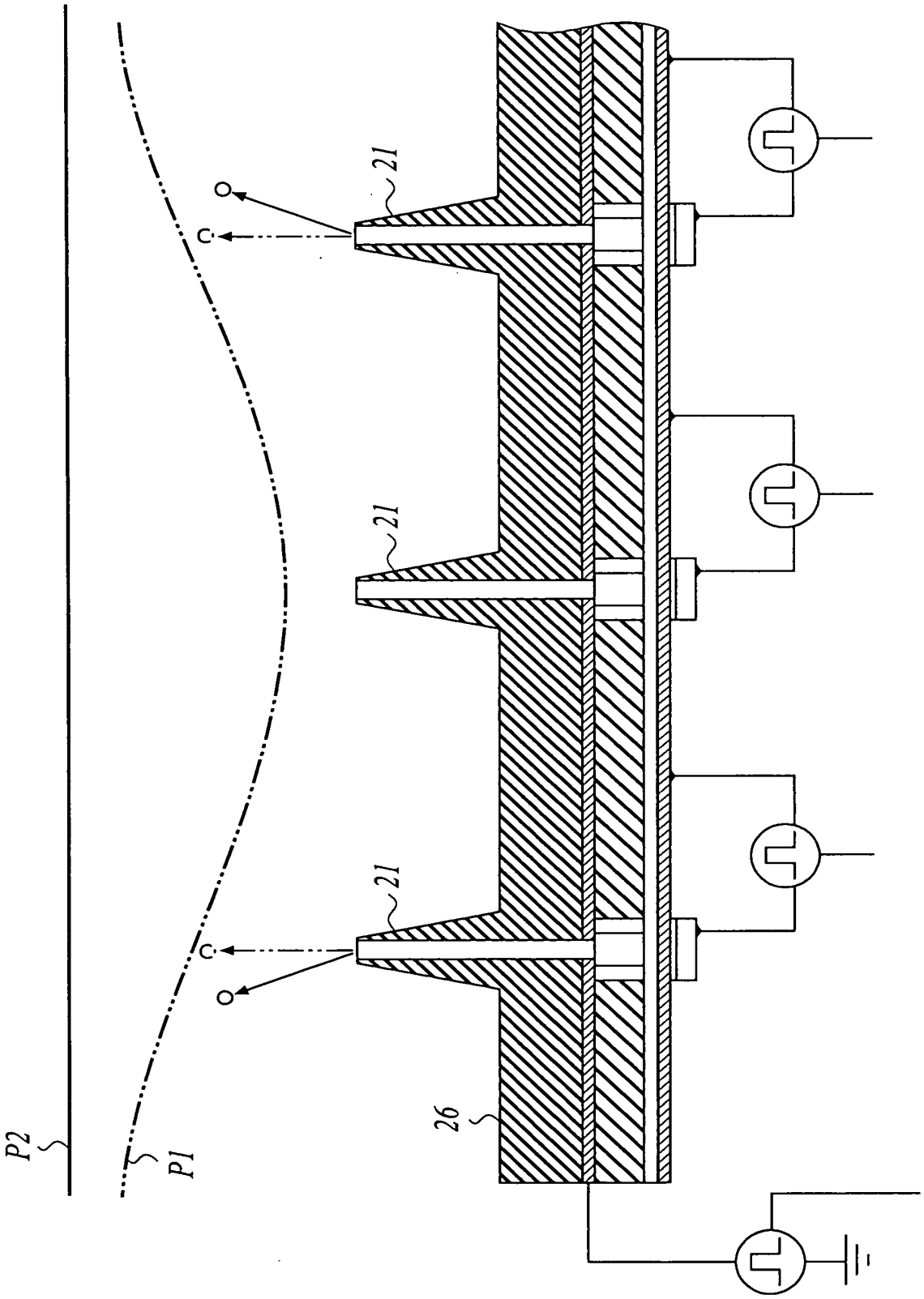

FIG.7

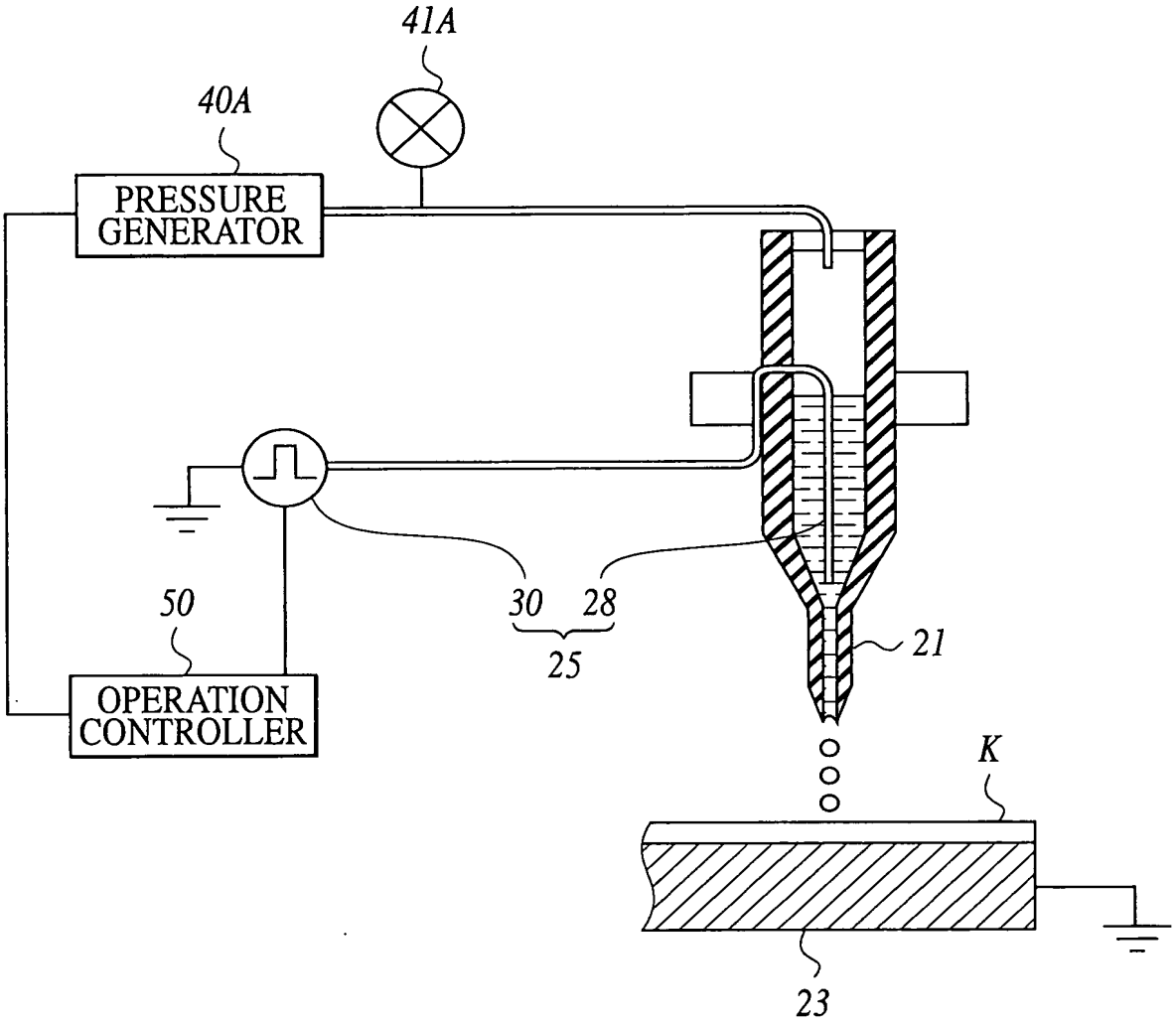
41A
40A
PRESSURE GENERATOR
50
OPERATION CONTROLLER
30
28
25
21
K
23

FIG.8

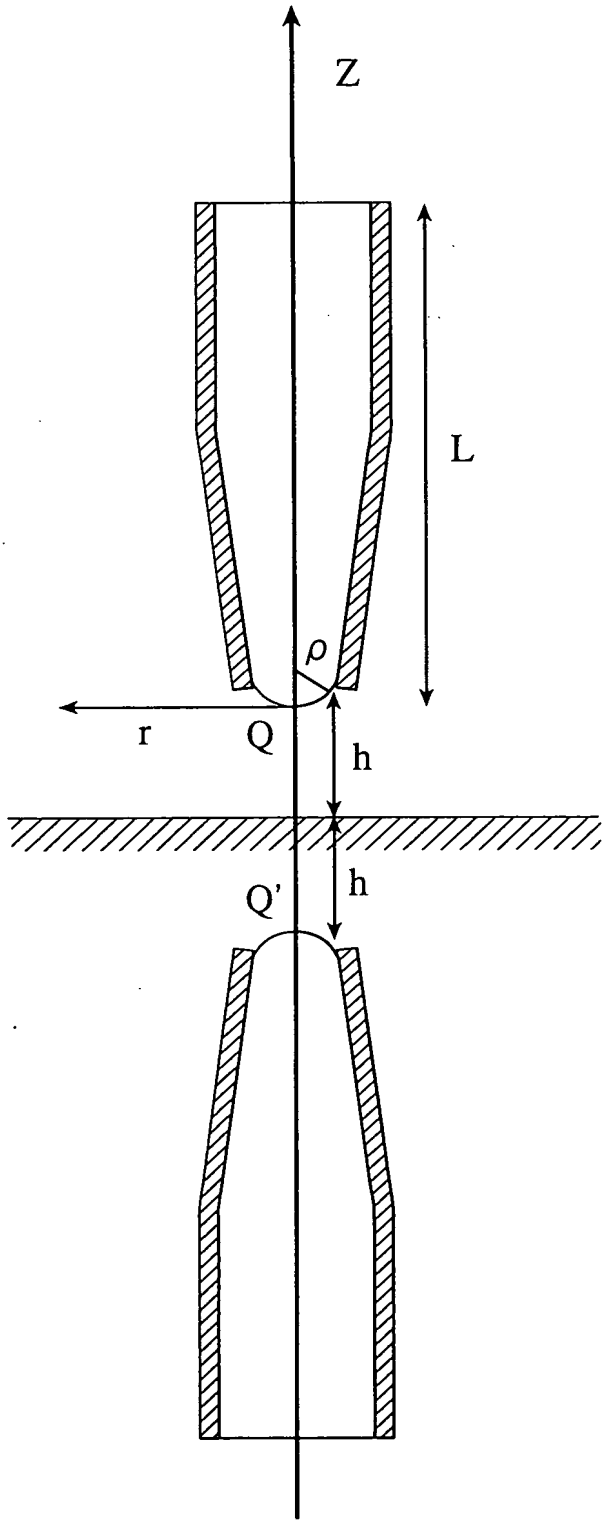

FIG 9

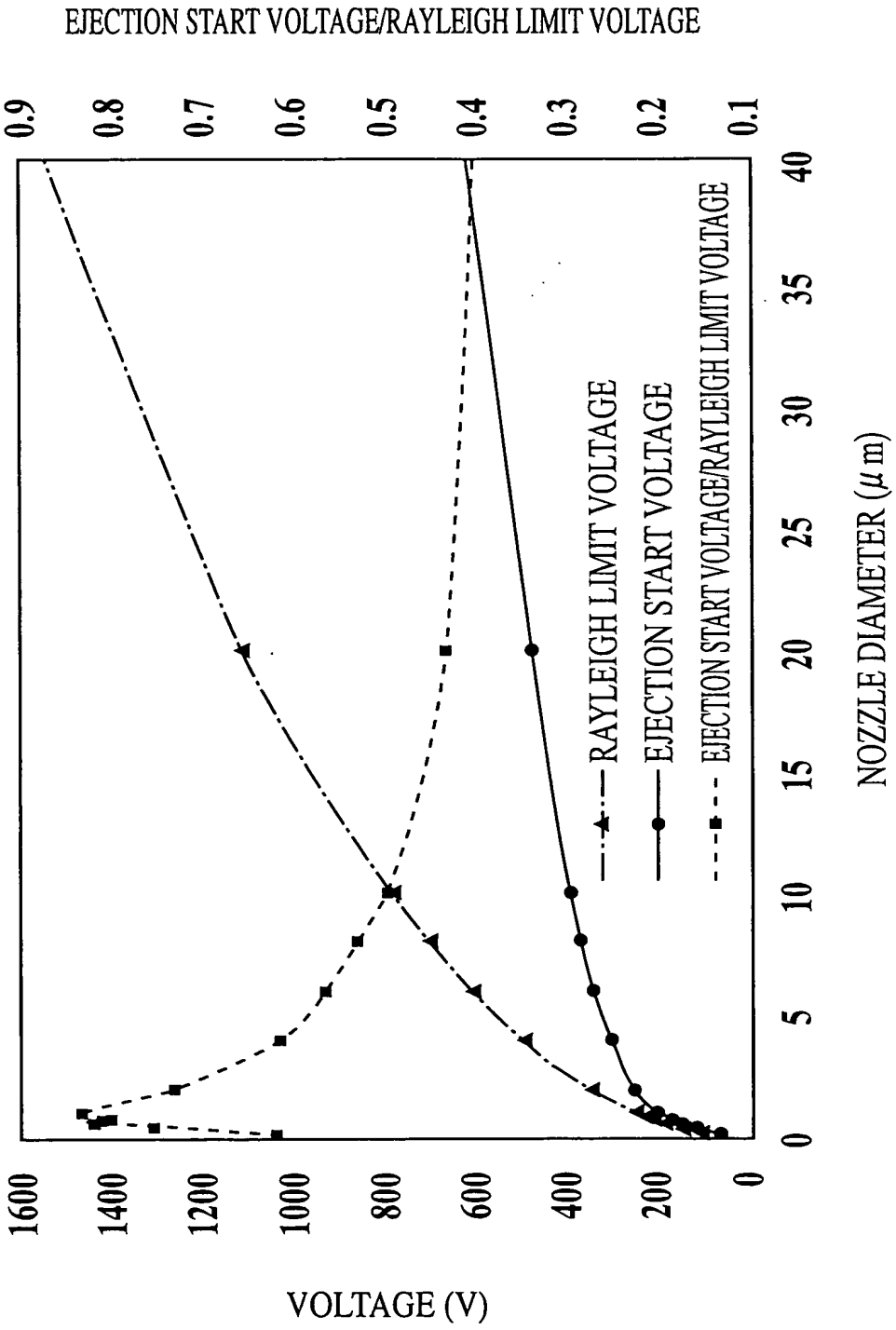
EJECTION START VOLTAGE/RAYLEIGH LIMIT VOLTAGE
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
5
10
15
20
25
30
35
40
NOZZLE DIAMETER (μm)
RAYLEIGH LIMIT VOLTAGE
EJECTION START VOLTAGE
EJECTION START VOLTAGE/RAYLEIGH LIMIT VOLTAGE
1600
1400
1200
1000
800
600
400
200
0
VOLTAGE (V)

FIG.10

NOZZLE DIAMETER (μm)	MAXIMUM ELECTRIC FIELD INTENSITY(V/m)		DEVIATION RATE (%)
	GAP 100 (μm)	GAP 2000 (μm)	
0.2	2.001×10^9	2.00005×10^9	0.05
0.4	1.001×10^9	1.00005×10^9	0.09
1	0.401002×10^9	0.40005×10^9	0.24
4	0.1010903×10^9	0.100112×10^9	0.97
8	0.0510196×10^9	0.05005×10^9	1.94
10	0.0410563×10^9	0.0400661×10^9	2.47
15	0.0277099×10^9	0.0267170×10^9	3.72
20	0.0210476×10^9	0.0200501×10^9	4.98
50	$0.009\,11111 \times 10^9$	0.00805×10^9	13.18

FIG.11

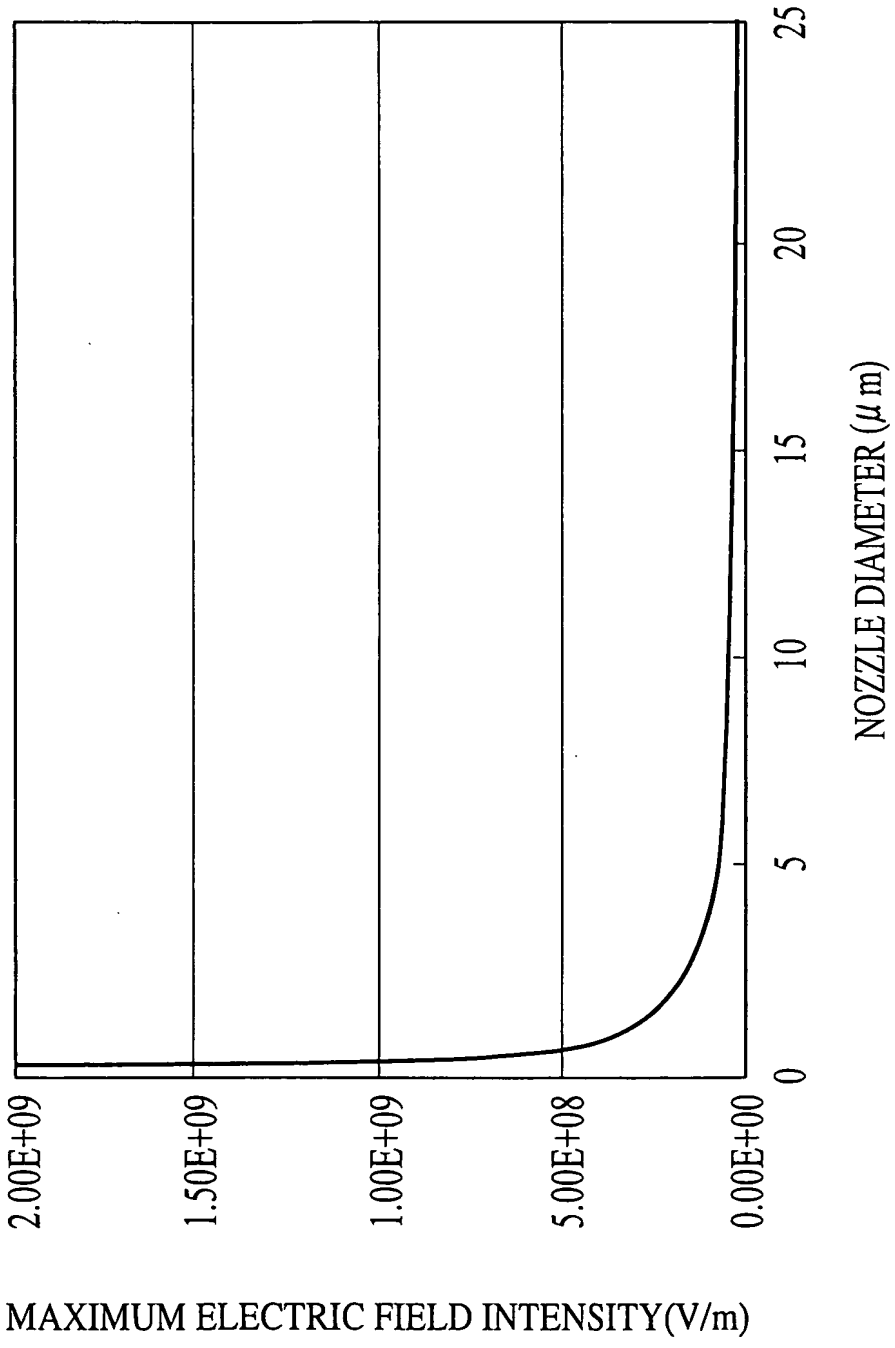
2.00E+09
1.50E+09
1.00E+09
5.00E+08
0.00E+00
MAXIMUM ELECTRIC FIELD INTENSITY(V/m)
0
5
10
15
20
25
NOZZLE DIAMETER (μm)

FIG.12A

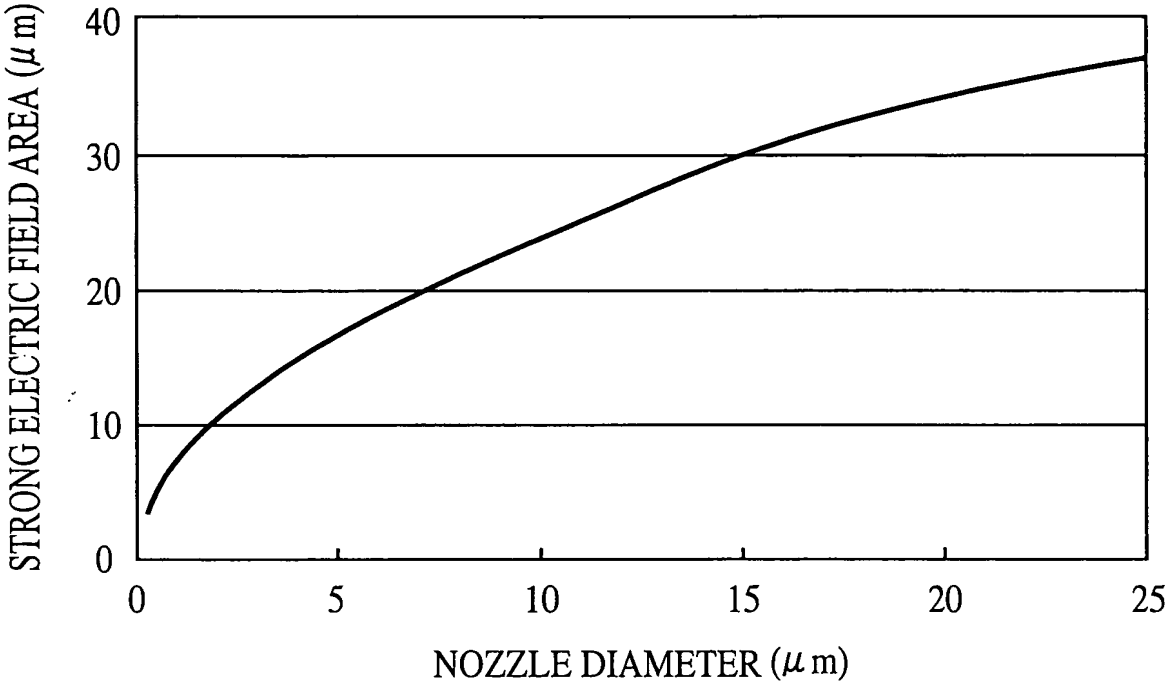

FIG.12B

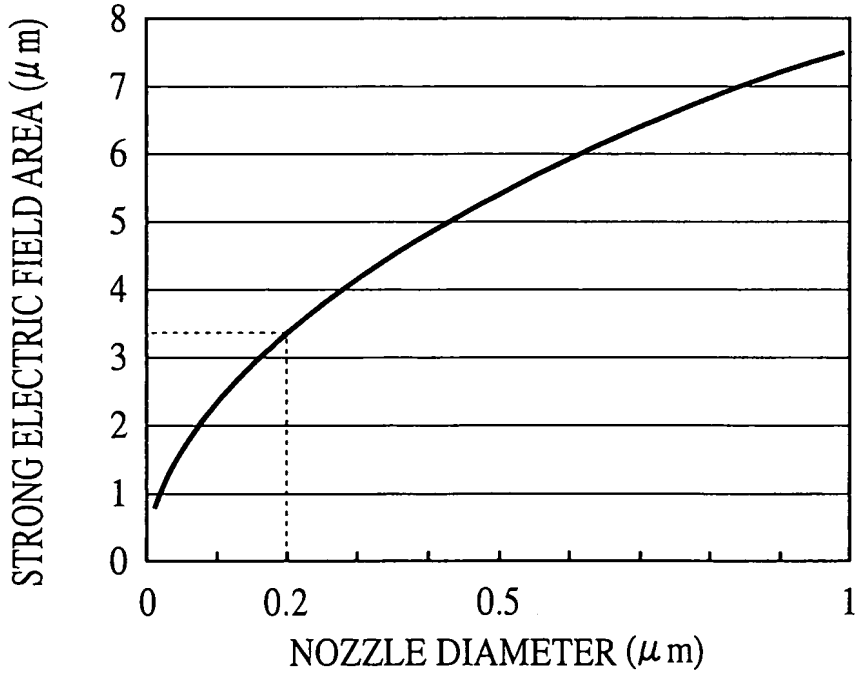

FIG13

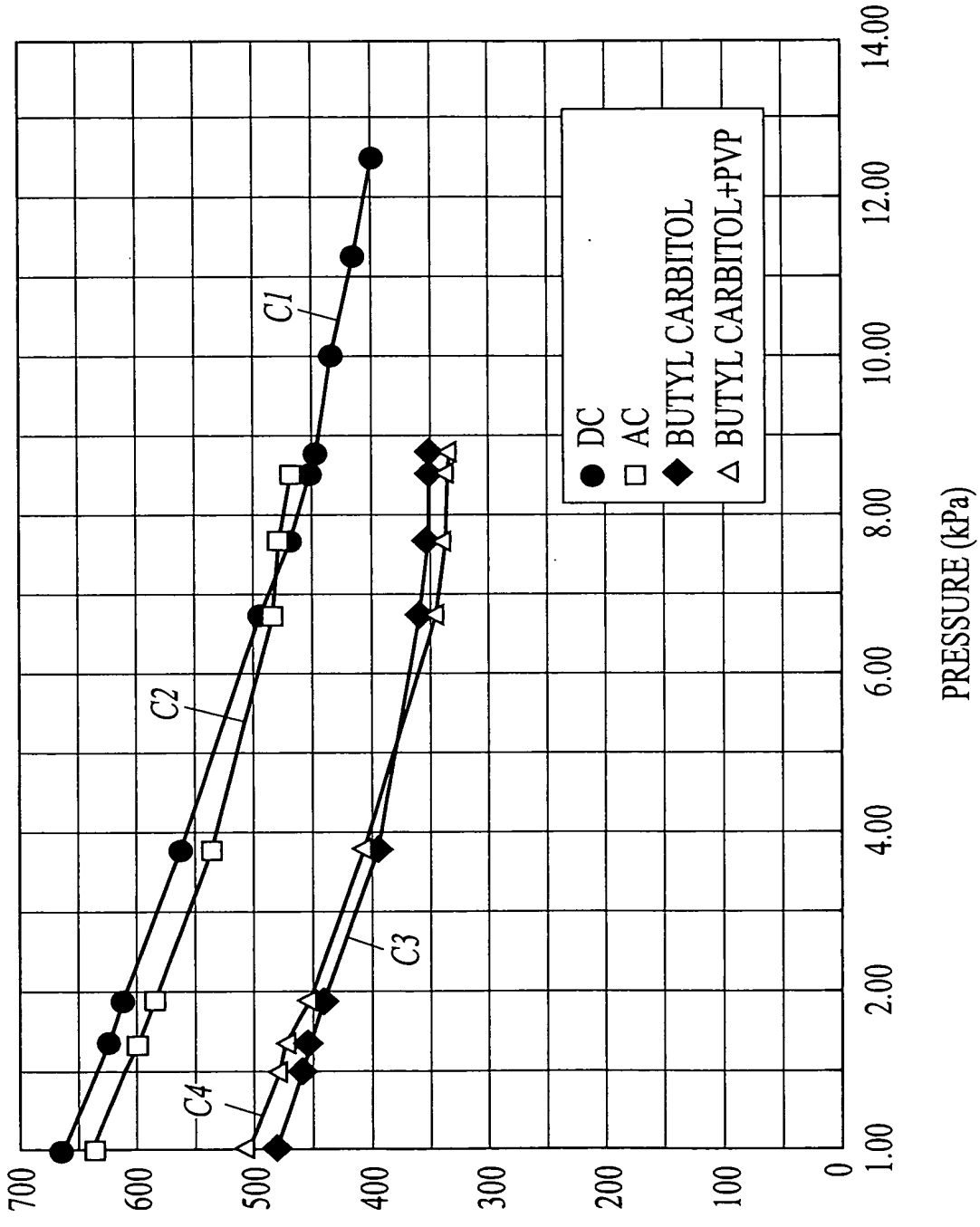
DC
AC
BUTYL CARBITOL
BUTYL CARBITOL+PVP
C1
C2
C3
C4
700
600
500
400
300
200
100
0
1.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
MINIMUM EJECTION VOLTAGE Vc (V)
PRESSURE (kPa)

FIG.14A

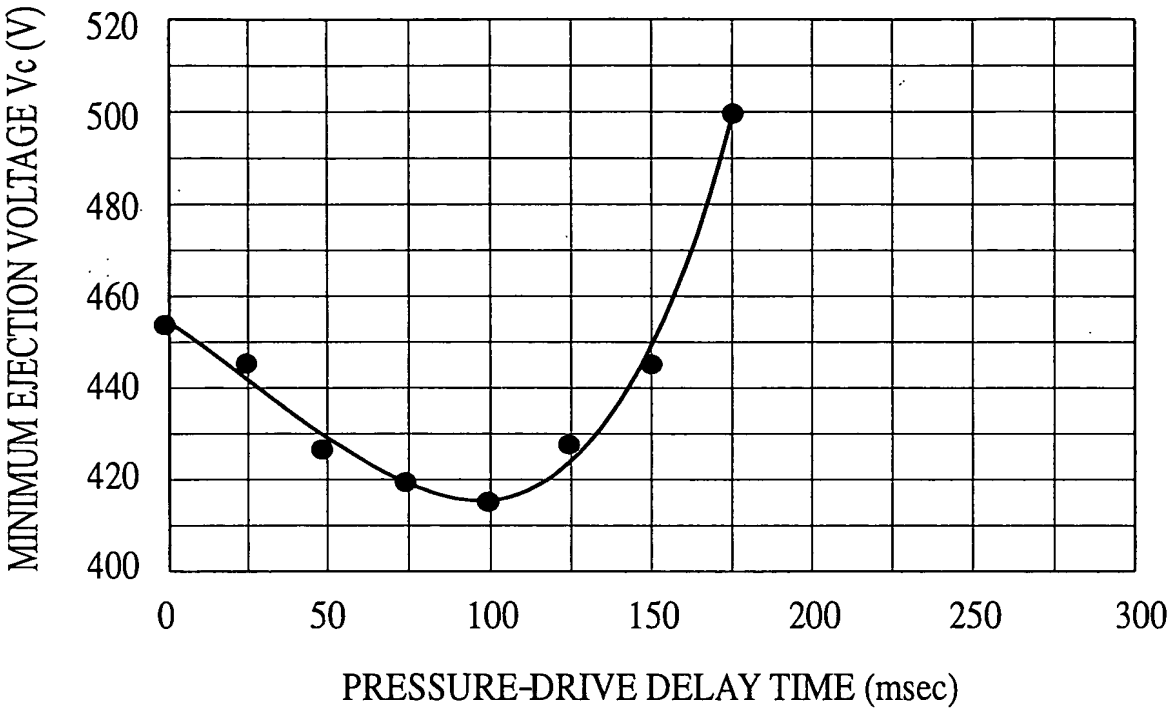

FIG.14B

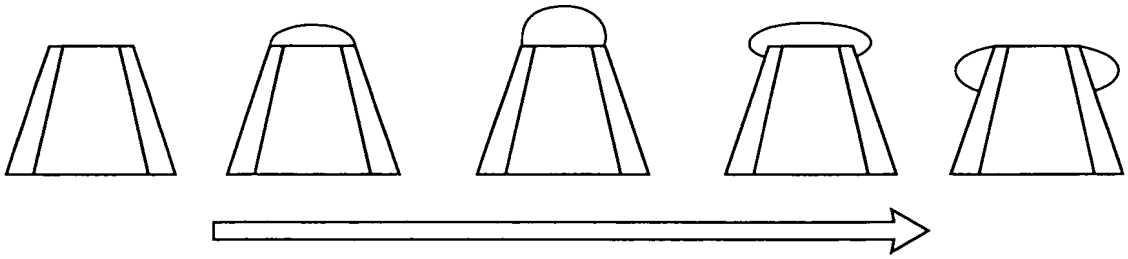

FIG.15

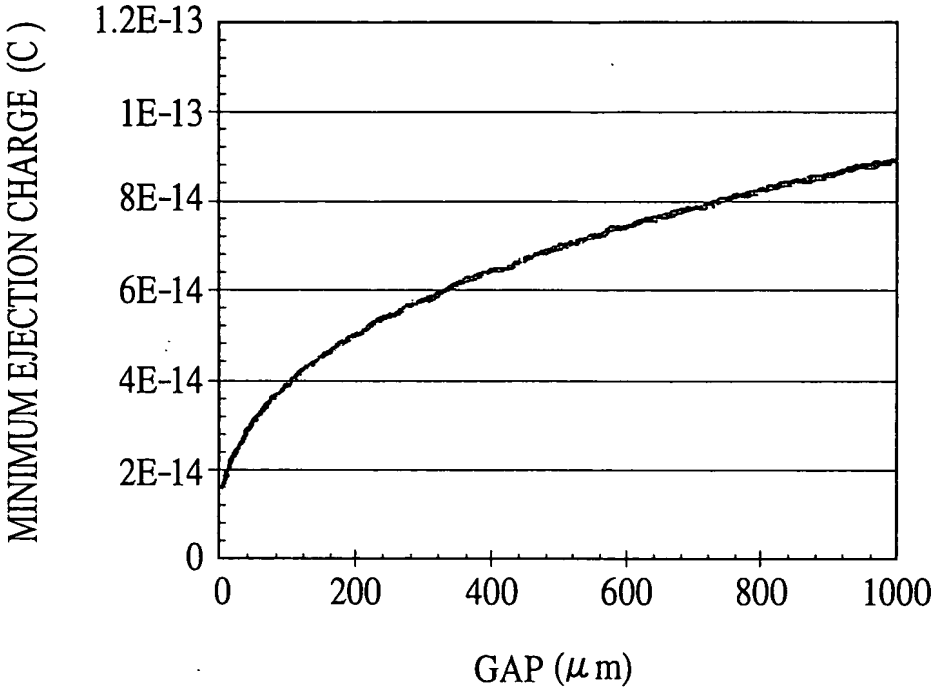

FIG.16

NOZZLE-SUBSTRATE GAP	MENISCUS CONTROL		
	NOT APPLIED	APPLIED	
		PRIOR ART (DC DRIVE)	PRESENT INVENTION (PULSE DRIVE)
50 (μm)	◎	◎	◎
100 (μm)	X:ATOMIZATION	○	◎
1000 (μm)	X:ATOMIZATION	○	◎

FIG.17

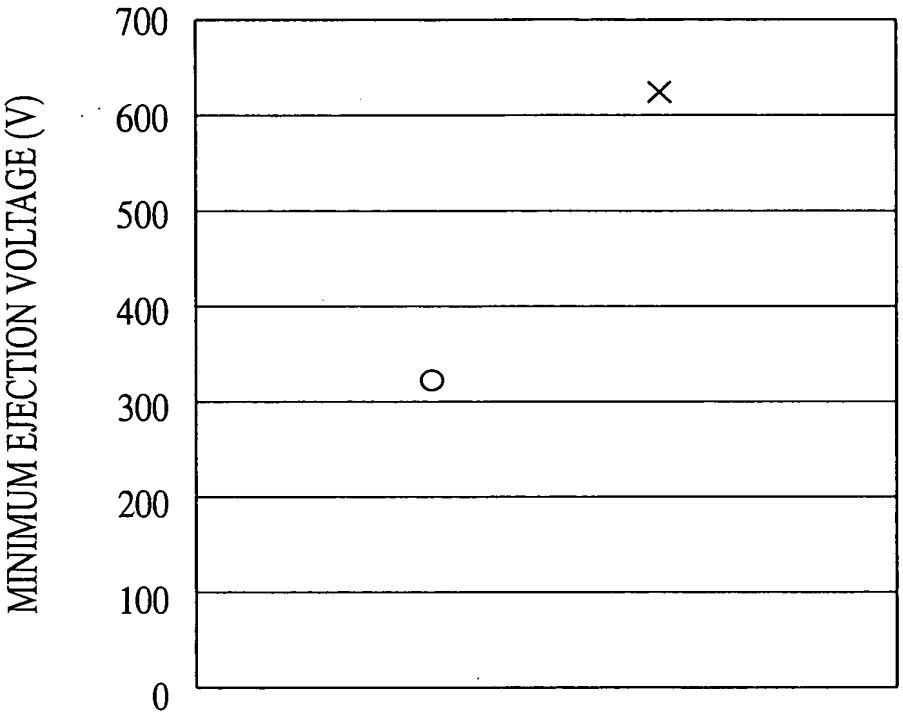

FIG.18

NOZZLE DIAMETER	DC BIAS VOLTAGE APPLIED	PULSE VOLTAGE APPLIED
30 (μm)	NO OOZING	NO OOZING
10 (μm)	OOZING	NO OOZING
1 (μm)	OOZING	NO OOZING

FIG.19

NOZZLE DIAMETER	DC BIAS VOLTAGE APPLIED	PULSE VOLTAGE APPLIED
30 (μm)	NO CLOGGING	NO CLOGGING
10 (μm)	CLOGGING	NO CLOGGING
1 (μm)	CLOGGING	NO CLOGGING